Effect of Multimedia Learning on Visual Attention, Academic Achievement and Positive Attitude of Hearing Impaired Students

A

Synopsis

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1.0 Introduction

Education is a lifelong process and it permeates every aspect of an individual's life. Education is the process to shape the quality of life which in turn enhances the quality of the society and the universe as a whole. Primary Education and its universalization is a natural commitment and an important concern all over the state of India. A school is an institution designed for teaching the students under the direction of teachers. Education is mainly concerned with the ways and means of teaching and learning. Even of these two, the latter appears to be more vital as it is not only concerned with what the teacher does but also with what knowledge he transmits to the students and what the student does to assimilate the knowledge. For a very long time, it was understood that more information transfer was teaching.

Disability has many contradictory definitions with respect to its various dimensions, there is no uniformity in those definitions to draw out a comprehensive view of disability. Definitions of disability themselves give rise to many problems and issues. These differences are due to many legal, political and social conflicts across the countries (EFAGMR, 2010). Deafness is an invisible disability. The term 'deaf' is being replaced by the term 'hearing impaired. 'Hearing challenged' is an alternate appropriate term. An individual who is hard of hearing since birth was earlier termed 'deaf and dumb'. Present age is the age of political correctness, these individuals have been redesignated as "congenitally deaf". So Children who cannot hear sounds at or above a certain intensity (loudness) level are classified as "deaf"; others with a hearing impairment are considered "hard of hearing". Deaf and hearing impaired are interchangeably used. In the present study, one of the above terms is used hearing impaired. The legal definition of "hearing disability" in India as per the Persons with Disability Act (PWD), 1995 is – "a hearing disabled person is one who has the hearing loss of 60 decibels or more in the better ear for conversational range of frequencies" (Orloline, 2013).

The National Association of the Deaf (N.A.D) is representative of the Deaf community in India; an organization that is of the Deaf, by the Deaf and for the Deaf. Even though recently established, yet

it already consists of a body of at least 2,500 members from across India. N.A.D is a voluntary, non-governmental, non-profit making organization. The aims of this organization are to promote the rights and quality of life of hearing impaired individuals in India, to foster a united front of hearing impaired across the different states of India and to promote equal rights at all levels and in all fields of life. The National Association of Deaf (NAD) defines the term "deaf" as persons who are incapable of hearing well enough to trust their hearing and to apply it as a means of processing information. Approximately 1: 2700 children are born deaf (Patel, 2010). The prevalence rises to approximately 1:1000 to 6:1000, when children who sustained hearing impairment in the first year of life are added to the statistics. The majority (95%) of these children are born in families without any prior experience of deafness. These statistics are true in all countries (Movallali & Nemati, 2009). Hearing is a prime necessarily for learning languages. Hearing people can read only those words/sentences of a language which they can speak. Hearing impaired having a loss of speech face many linguistic problems. Communicational media like T.V., Radio and gossip with friends and siblings inhibit their perception of any received information causing hindrances in attaining depth and maturity in general awareness and general knowledge. This lack in information results in a wide gap in their comprehension, sentence framing, vocabulary enrichment etc. which in turn directly effects their concepts formation (Hindley, Heider 2008; Patel 2010).

International document like United Convention on the Right of the child 1993, UNESCO 2006, Salamemla statement 2000,World education Forum in Dakar 2002 and National document and researches taken by NCERT,NUEPA,AISES 2008 revealed many problems in the teaching learning environment of hearing impaired child which lead to a huge gap between the enrolment of upper primary students and secondary level and there is an urgent need to raise the enrolment number of these children so as to decrease dropout rate.

The prevalence of hearing impairments in our country is 59 lacks out of 21.9 million handicapped as per Disability News and Information Service Organization (DNISO 2011-12) showing that every 2 out of 5 disabled are hearing impaired rural populations treat them as mentally, emotionally and

intellectually disabled due to awareness and ignorance. Language development, cognition, skills and mentally can be developed with the help of oral skills. Communication a key to education develops cohesive bonding between teachers and students.

1.1 Multimedia Learning

Researches using new technologies in teaching learning process are meant to be highly relevant dynamic and suitable for the present needs of the society (Muller et al., 2006). Multimedia technology is considered to be most interesting in the present era of information. Its importance demanded fundamental changes in the field of computing, entrainment and education (Norhayati & Siew 2004). Multimedia concept is recent one started in 1990s. It increases the quality of learning by revitalizing the atmosphere. Learners with their existing individual differences can improve their learning in a conducive environment using interactive Multimedia with an opportunity for more realistic learning (Margie & Liu, 1996).

Multimedia approach can be applied in more than one medium which may consists of some or not necessarily all elements like: text; still graphic images; motion graphics; animations; hypermedia; photographs; videos; and audios with sound music and narration. Formats may be in different contexts for giving the same information through multimedia for more learning (Ke, 2008). As the information is presented in various formats, multimedia enhances user experience and makes it easier and faster to grasp. Stitch (2003) study shows that the use of animation in teaching cell biology and all fields of biology are beneficial. It was found that scalable interactive animation with hot keys and rollover help to enhance the learning in effective way. Animated illustration accompanied with audio, video, and kinetic are much better to the cell biology learners than static illustrations (Stith, 2004).

A project based on a few interactive multimedia packages in subjects like science, math's, geography and history revealed that these packages are much better than the traditional methods of teaching based on lectures (Kamat, 2009). Whole designing a course material through a number of combinations of text graphics, sound, music, and animation leads to better learning due to multi-

sensing communication which in turn motives. The students learn, assimilate the knowledge, transfer the gained information with the help of more ways in presenting the content of education.

“Educators should have access to appropriate ways to design software packages that will take advantage of multimedia capabilities without losing the focus on the user's needs or the content being presented” (Bailey & Milheim, 1991). Nowadays, introducing new technologies of information and communication in people with special needs education such as deaf peoples becomes a necessity. This representation should respond to many criteria: first, it should be easily understood and adopted by the deaf. Second, it should not require a big memory space, and finally, it must be easily adapted with computer technology.

1.2 Visual Attention

Visual attention refers to the mechanism by which the eyes to pick certain objects from the wide range of objects in the field of view so that the brain can concentrate on them. The clutter of scenes presented before the human eye are often more that can be perceived simultaneously therefore the eye focuses on a few at a time. The brain relies on attention to bring salient details into focus and filter out background clutter.

Visual attention is the process in which the human brain decides which details within a person's field of vision are important and should be focused upon, and which are largely ignored and filtered into the background. Information, such as environments with low light levels, are often increased in detail by the brain to ensure the information required is processed effectively. If background information was not filtered by attention determining areas of the brain, a person would be overwhelmed by the sheer amount of visual information the eyes pick up.

The process by which the brain filters information and determines which details are required at a given moment is not fully understood by researchers; different models of how information is processed in the brain have been created, but none are proven. Visual attention is important in the everyday life of humans because without the ability to filter information, tasks such as driving would prove almost impossible to complete safely. By placing the attention of the brain onto

required details, such as speed limit signs, potentially dangerous situations can be avoided as the brain highlights important details.

Successful communication with profoundly deaf children is heavily dependent on visual attention. Previous research has shown that mothers of deaf children--notably those who are deaf themselves--use a variety of strategies to gain their children's attention.

1.3 Academic Achievement

Academic achievement or academic performance is the outcome of education — the extent to which a student, teacher or institution has achieved their educational goals. Academic achievement is commonly measured by examinations or continuous assessment.

Good performance in science on the other hand is a prerequisite to pursuance of some lucrative career courses at the university level like medicine and engineering. Research on the academic achievement of students with hearing loss indicates that they lag far behind what is expected of their hearing peers at similar ages or grade levels (Allen, 1986). By high school, about 50% of a national sample of students with hearing loss was performing at a below-basic proficiency level in reading comprehension and math problem solving (Traxler, 2000). Lauwerier L (2003) examined the cognitive function of hearing impaired children from a review of the literature. Most studies showed that deaf children are similar to normal children in virtually all aspects of cognitive function; many studies also emphasize pronounced differences in their academic achievement. Besides the degree of hearing loss and the age at onset of deafness, environmental factors (such as parental support and educational methods) seem to enhance cognition and academic success of these children.

1.4 Positive Attitude towards Academic Achievement

A positive attitude is the beliefs that can increase the achievement through optimistic thought processes. A positive attitude covers positive thinking from observational learning in the environment and is partially achieved when a vision of good natural change in the mind is applied towards people, circumstances events or behaviors.

It is the readiness of the psyche to act or react in a certain way.

-Jung

Dictionary.com defines attitude as "a state of mind or a feeling; disposition: had a positive attitude about work."

For the past 20 years researchers have examined the attitudes of a variety of professionals towards individuals with disabilities. Although many researchers found that people in general possess negative attitude towards individuals with disabilities. (Gething, Lacour, & Wheeler ,1994; Yuker 1994). The spoken language acquisition is directly related to two factors namely degree of hearing loss and the appropriate amplification fitted to the child. This delay in language acquisition deteriorates the academic performance (Moores, 1987, 1996; Maxon & Brackett, 1992). Academic achievement is directly related to reading and writing and high level of speech intelligibility. Students who are not integrated because of their communication difficulties may have feelings of loneliness. They tend to be quiet as a result both inside and outside the classroom, thus in turn will affect academic achievement. Hearing impaired students requires the ability of them to communicate with their teachers and other students. This is major requisite to academic success. Students performance in the classroom was affected by communication difficulties associated with their hearing and this in turn affected their academic achievement.

The level of achievement is related to the quantity, quality and timing of the support services received by children. There is need to provide technology based teaching for enhancing the positive attitude of hearing impaired children which in turn improves their academic achievement. New technological learning covers the existing gaps and acts as a bridge for learning effectively.

2.0 Emergence of the Problem

Education for all is the fundamental right given to every child of this country. The education for all includes all kind of children irrespective of their individual differences. Inclusion in education

includes the provision of friendly teaching learning environment for the handicapped also. According to Curriculum Review2007……. We passionately believe that it is the duty of all schools to address the issues of "How to love together" and dealing with differences. However controversial and difficulty they might sometimes seen "**SSA ensures that every child with special needs, irrespective of the kind, category and degree of disability, is provided education in an appropriate environment. SSA adopts 'zero rejection' policy so that no child with special needs is deprived of the right to education".** Persons with disabilities in India are often left out of mainstream schools and universities due to a variety of reasons, primarily the lack of awareness amongst educational organizations and teachers, near absence of infrastructural resources and lack of training in this regard. It is believed that barely two per cent of the 70 million disabled persons have access to education in India.

Hearing impairment is an invisible disability as they could not hear minute sounds they pretend to be alternative or paying interest in the class but due to lack of hearing ability they lag behind in their academic achievement. Due to the academic scores these children are treated as intellectually disabled or learning disabled. National Association of deaf (NAD) believe that due to lack of communicative skills a huge gap lies between teacher and pupils and children could not understand or comprehend the concept taught in the class by the teachers. Education of the hearing impaired is not in an uniform pattern all over world. Hearing impaired delays lag behind their hearing peers academically. At the age of 12 years there children can read 4.5 grade level in western countries. But the data or level of education are not known for developing nations due to the lacunae in the educational applications in the system of education.

All the organizations, committees and departments feel the urgent need to be implemented in the teaching learning environment of these children. For rejuvenating the education of hearing impaired traditional methods of teaching which are generally used by the teachers are proved to be unsuccessful. Hence there is a need to rejuvenating teaching learning environment through modern technologies using multimedia. The researcher identified the drawbacks faced by hearing impaired

child in learning concepts in subjects like science, mathematics and wants to find out solution for the following questions:

-Why hearing impaired children lag behind in their academic achievement?

-Are the existing method of teaching suitable to enhance their academic achievement?

-Are there any methods to compensate their hearing backlog by some new methods based on visual capacities of these children which are on the stronger side?

-Is there any approach of learning using multimedia technologies to make hearing impaired academically better and positively motivated?

3.0 Justification of the Problem

Independent India dreams about Free Compulsory Education for 6 to 14 years the Constitutional Articles. Even after 67 years of in dependence their target of Free India remained incomplete due to the existing individual differences among the children and the measuring stick of our education system is one and the only source for all the children. Elementary education, a foundation stone of education ladder may shake of fall the entire edifice of education. SSA adopts "zero rejection" policy for welcoming children with special needs.

The enrolment rate subsequently increased after the implementation of SSA but the actual situation of the classrooms is very pity as the live participation of the children in elementary classes is at a lower rate. The emphasis on inclusion CSWN (children with special needs) into formal elementary schools protect the right to education of these children and creates a conducive environment to these children for developing positive attitude in their personalities decreasing the dropout rate of these children as shown in the educational records.

The Seventh All India School Education Survey (7th AISES, 2008) gives the following enrolment data for students with disabilities at the upper primary, secondary, higher secondary stage. The data is particularly relevant in the context of this study as it indicates relevant gaps in enrolment between the children passing out of upper primary classes and children enrolled at the secondary level.

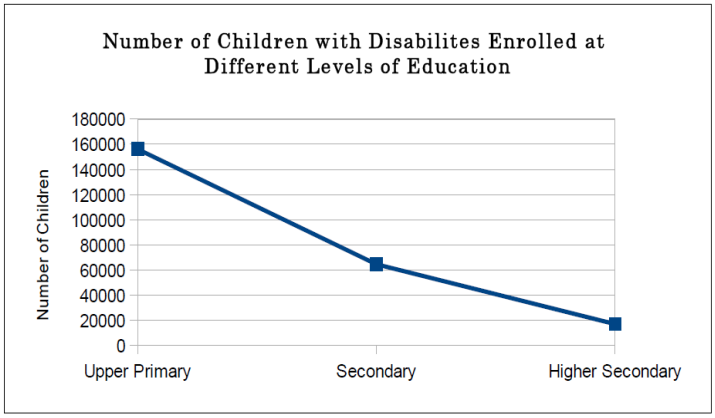

Figure 1: Number of children with disabilities Enrolled at different levels of Education

Table 1

Gender wise enrolment of children in various levels of education is as under-

	Primary	**Upper Primary**	**Secondary**	**Higher Secondary**
Boys	500311	200712	101461	37382
Girls	310836	121389	60738	22234

Figures given above clearly show the huge gap between the upper primary and secondary level. It also shows a high gender gap. In spite of all the efforts taken up by the Government and voluntary organizations, the percentage of CWSN to total enrolment in elementary classes is a mere 0.74 (2010-11) at primary level and 0.70 (2010-11) at upper primary level (NUEPA, 2012).

The fact is that CWSN are often subjected to negligence, segregation, deprivation and discrimination because of the wide-scale negative social attitude towards them that are still prevalent in the society. The current status of the education of the hearing impaired in India today is extremely poor. Oralism is still the prevailing method of educating the hearing impaired. Hearing impaired children are not taught in Sign Language. The present scenario of education for hearing impaired in India is extremely poor. Teaching methods is oralism and the sign language is not used which hinders their educational development and ultimately leads to unemployment. To get employable skills they should be trained in language, cognition and social skills. National

Association of the Deaf believes in a drastic change in the communicative access to curricula of the hearing impaired.

Many international researches conducted from 2000 to 2010 (Bruce Lee, Turm Davis, Andrews Joel, Edwarde, Adoyo 2007,Moest 2010 etc) and national surveys and researches conducted by NCERT,NUEPA,NSSO,AISES NAD etc revealed the following lacunae in the education of the hearing impaired children especially in the classes from primary to upper primary.

Decreasing enrolment rate and increasing dropout rate from primary level of education to upper primary level:

-Lack of language competence and appropriate communication

-A gap between curricula and the teaching learning environment in the schools

-Lack of support and motivation to the students

-Implementing the traditional methods of teaching i.e. chalk and talk method by the teacher

-Limited participation and interaction of students

-Poor self esteem, self confidence and lack of positive attitude leading to isolation and depression among hearing impaired children

-Negligence and lack of hindrances spirit among teacher creates in their oral and written communication

- Personal attention to strength the skills of the student by the teachers is the present need for improving the education level of these students (Karen 2000, Navin 1987, Alahmadi 2001)

Now the classrooms require special consideration to evict the demand of the children with disabilities so as to develop positive attitudes in their personality so that they will be made assertive to face the challenges within the community and society.

Traditional teaching methods and tools applied in classrooms are not found to be attractive or thrilling resulting in bore dum fatigue. New technologies proved to be successful through many researches for improving the ability of handicapped children. Use of visual media during teaching learning promotes attention and interest among these children

Tell me and I will forget

Show me I may remember

Involve me and I will understand

-Chinese Proverb

Multimedia learning aims to prove the Chinese proverb by creating a conducive teaching learning environment in the classroom. More involvement and interaction with equality, applicability and creativity develops attention and positive attitude among hearing impaired children to lead a meaningful life to teach the goal of education which is common to all irrespective of their differences.

The researcher found many problems underlying the education of hearing impaired children as proved by the researches and multimedia learning approach is thought to be a reasonable remedy for developing attention, positive attitude and motivation among these children, thus increasing the academic achievement of these children which may boost them to uplift their education to higher classes.

3.0 Statement of the Problem

The research problem can be stated as below:

Effect of Multimedia learning on Visual Attention, Academic Achievement and Positive Attitude of Hearing Impaired Students

4.0 Variables of the Study

The variables of the study have been classified as follows:

Independent variables: Multimedia learning

Dependent variables: Visual Attention, Academic Achievement and Positive Attitude

Controlled variables: Teaching of Science, Age (10-13), Upper Primary Classes of hearing impaired students

5.0 Objectives of the Study

The purpose of the study is six fold:

1. To study the effect of traditional learning on Visual Attention of hearing impaired students of upper primary classes.
2. To study the effect of traditional learning on Academic achievement of hearing impaired students of upper primary classes.
3. To study the effect of traditional learning on Positive Attitude of hearing impaired students of upper primary classes.
4. To develop Multimedia learning approach lesson plan hearing impaired students of upper primary classes.
5. To study the effect of Multimedia learning on Visual Attention of hearing impaired students of upper primary classes.
6. To study the effect of Multimedia learning on Academic Achievement of hearing impaired students of upper primary classes.
7. To study the effect of Multimedia learning on Positive Attitude of hearing impaired students of upper primary classes.

6.0 Hypothesis

1. There will be no significant effect of Multimedia learning on visual attention of hearing impaired students of upper primary classes.
2. There will be no significant effect of Multimedia learning on academic achievement of hearing impaired students of upper primary classes.
3. There will be no significant effect of Multimedia learning on positive attitude of hearing impaired students of upper primary classes.

7.0 Delimitations of the Study

The study will be delimited in the following ways:

1. The study will be delimited to Agra city only.

2. The study will be delimited for upper primary schools of hearing impaired students of 10-13years.
3. The study will be confined to the Teaching of Science subject only.
4. Positive attitude regarding academic achievement of hearing impaired students will only be taken in to consideration.

8.0 Operational Definitions of the terms

Multimedia Learning- Multimedia Learning is learning that includes the following elements: text; still graphic images; motion graphics; animations; hypermedia; photographs; video; and audio, i.e., sounds, music, and narration.

Visual Attention -Visual attention includes visual and verbal both in which the user's eye pick up and focuses his/her attention upon the concept taught through multimedia learning.

Academic achievement – Academic achievement is the achievement of students in the period of learning, exercise and is measured by examination in science.

Positive attitude - Positive attitude is the attitude to think positively about concept learnt through multimedia learning to improve the academic achievement of hearing impaired students.

Upper Primary Classes - Upper primary classes is that classes in which student are enrolled in classes 6,7,8.

9.0 Design of the Study

The research design for the present study is as follow:

9.1 Sampling Procedure:

Hearing impaired school will be selected through purposive sampling. A sample of 60 students in age range10-13 with hearing impaired of will be taken for the present study. In the next step, tools will be administered on hearing impaired students. 30 hearing impaired students will taken in to study as from school1 and 30 hearing impaired students from school2 will be taken as experimental group for the research. Hearing impaired school will be selected by the researcher for conductive present study.

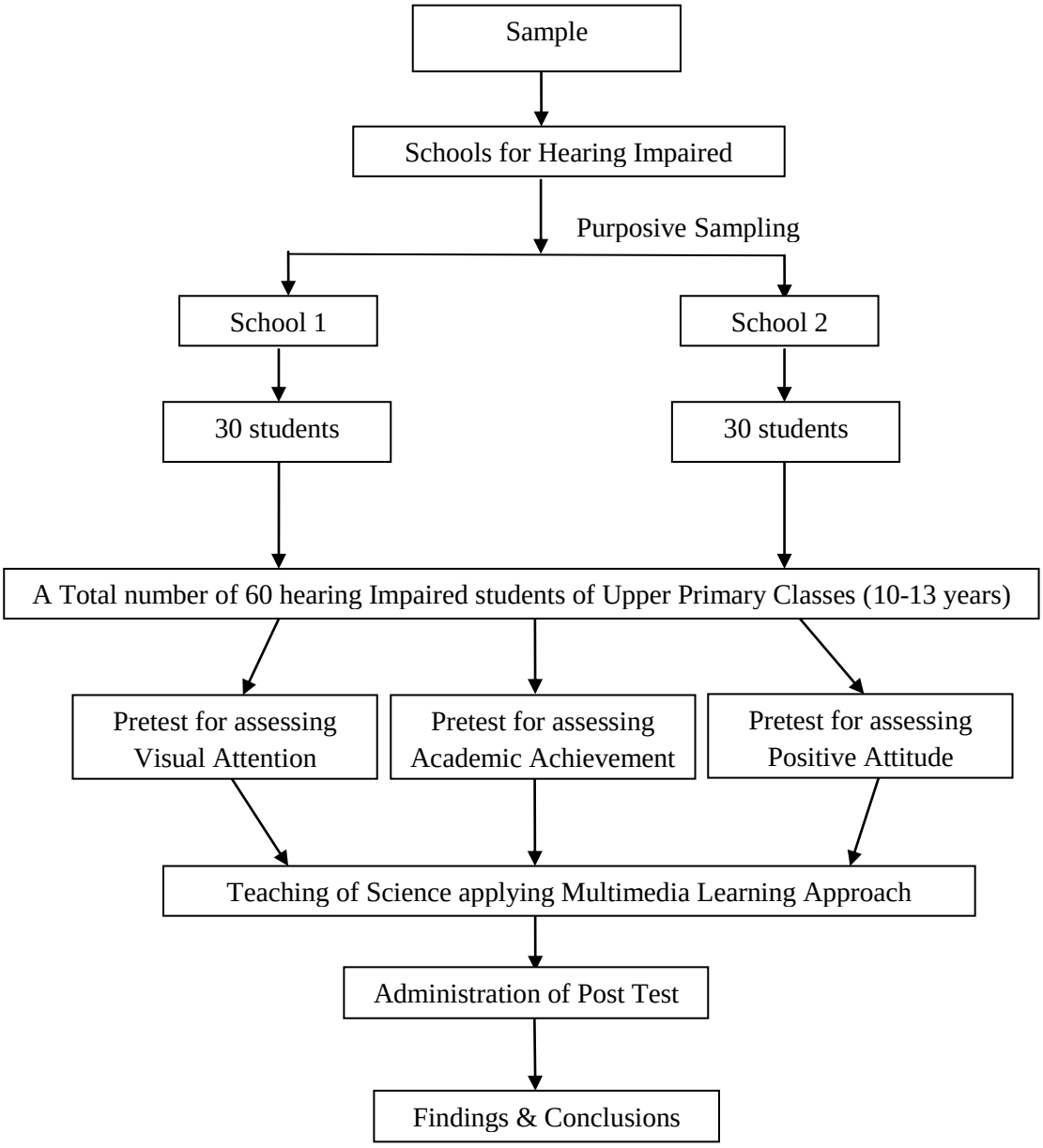
Sample
Schools for Hearing Impaired
Purposive Sampling
School 1
School 2
30 students
30 students
A Total number of 60 hearing Impaired students of Upper Primary Classes (10-13 years)
Pretest for assessing Visual Attention
Pretest for assessing Academic Achievement
Pretest for assessing Positive Attitude
Teaching of Science applying Multimedia Learning Approach
Administration of Post Test
Findings & Conclusions

Figure2: Procedure of Sample Selection

9.2 Method of the Study

Quasi Experimental Design with matching-only pre-test - post-test single group will be used by the researcher in the present study. In the interventional group researcher will teach the hearing impaired students with the help of multimedia.

The following design will be followed by the researcher to accomplish the desired objectives of the research.

Pre Test	Treatment with Independent Variables	Post test
Visual Attention, Academic Achievement and Positive Attitude before Teaching with Multimedia	Multimedia Learning	Visual Attention, Academic Achievement and Positive Attitude after Teaching with Multimedia

Figure3. Design of the study

9.3 Tools:

The following tools will be used for collection of required data:

1. Multimedia learning -Self prepared 30 lesson plans in science using multimedia learning by using Adobe Flash CS6 as an authoring tool. This tool has open access to all. No multimedia learning program is available exclusively for hearing impaired students so self made multimedia program prepared by researcher to study the effect of multimedia learning on Academic achievement of hearing impaired students of upper primary classes. 10 lesson plans of science are prepared for each class of upper primary school.
2. Academic achievement -Pretest and post test for measuring academic achievement will be prepared by the researcher. It consists of 10 chapters of Science of each class of upper primary school. Researcher will prepare a self made test for academic achievement to study the effect of multimedia learning on Academic achievement of hearing impaired students of upper primary classes. Achievement test will be prepared by the researcher on the basis on 10 chapters of their text book before and after which are taught by the researcher in both groups during experimental phase to study the impact of multimedia learning on academic achievement of hearing impaired students.
3. Visual attention -For measuring visual attention Tracking Eye Movement with a Webcam will be used. OpenGazer is licensed under GPLv2, and includes a Python application called

HeadTracker that tracks head motion in order to narrow down the field of vision that OpenGazer watches for eye movement. Any USB Webcam supported by Linux will work.

4. Positive attitude – No tool is available specifically for hearing impaired students to measure their positive attitude. Hence self-prepared questionnaire for measuring the various dimensions of positive attitude strength, importance, accessibility, complexity, ambivalence, coherence. Researcher will prepare a self made test for Positive attitude to study the effect of multimedia learning on Positive attitude of hearing impaired students of upper primary classes.

9.4 Procedure of the study

The present study will be carried out in following stages:

Stage1: Construction of the Tools

In this stage the researcher will construct the following tools-

1- Multimedia based lesson plans for class 6,7,8 (upper primary) hearing impaired students.

2- Visual attention tool to measure attention on image and text part of multimedia program before and after implementing learning program.

3- Academic achievement by comparing the marks achieved in pretest and posttest during the application of multimedia learning.

4- Positive attitude questionnaire to measure effect of multimedia learning program on hearing impaired students.

Stage2: Construction of Multimedia based lesson plans

The multimedia program will be frames and applied by a combination of many multimedia elements (text, images, sound, videos and animation). Special attention will be given to the colors, animation, and character to make it more appealing and unique than traditional way of learning. Multimedia program will cover topics in science for class 6,7,8 text books ment for hearing impaired students. Multimedia lesson plan will be delivered in a period of 40 minutes for 30 days in each school. This program will be developing by using Adobe Flash CS6 as an authorized tool.

Stage3: Administration of pre-test of academic achievement, positive attitude on hearing impaired students of upper primary classes

Stage4: Administration of multimedia learning program on hearing impaired students of upper primary classes

Stage5: Administration of eye tracker software for measuring visual attention of hearing impaired students of upper primary classes

Stage6: Administration of post-test of academic achievement, positive attitude on hearing impaired students of upper primary classes

Stage7: Testing of hypothesis

This stage will comprise of the testing of hypothesis on the scores obtained from pre test and post test.

9.5 Statistical Techniques

To achieve the objectives of the study the researcher will be employing the following statistical techniques.

Descriptive statistics

Certain descriptive statistics will be used in order to describe the nature and distribution of the scores obtained on the various tests, such as

Mean: The mean value will be computed as a measure of central tendency of the distribution of achievement scores.

Standard Deviation: This will be computed to study the variation in the scores and to do other various computations.

Graphical representation of data: This will be used to interpret the data through the bar diagrams, etc.

Inferential Statistics: Parametric inferential statistics will be used in present investigation to test the various hypotheses of the study, Analysis of Covariance (ANCOVA), Variance of Analysis (ANOVA) will be applied to draw definite conclusion on the basis of the obtained results.

10.0 Significance of the Study

Every child has an equal right to be educated as per the constitution and we can't bring about optimum human resource development without upliftment of hearing impaired students. Achievement in science plays a major role in the development in education. It will be possible to solve the problem of quality education, wastage and to achieve the target of universalization. Universalization dosen't mean to raise the universal enrollment and universal retention. But by conducting the research in this field will shed light on the appropriate teaching interventions for them. It will also bring awareness among educationists, parents, administrators to understand their needs and implement appropriate teaching methods that may help them to acquire knowledge.

Until now, researchers have focused mainly on interventions related to teaching. If we are able to enhance innovative methods in teaching for hearing impaired students, we can say that to some extent it will have positive impact on achievement also. Thus we hope that this research work will provide a productive way forward to help hearing impaired students and as a means of removing obstacles from their path of progress and also to improve academic achievement.

References

Bailey, H. J. & Milheim, W. D. (1991, February). A Comprehensive Model for Designing Interactive Video Based Materials. Proceedings of the Ninth Conference on Interactive Instruction Delivery, 1991. Society for Applied Learning Technology Conference, Orlando, FL.

Garg, S., Chadha, S., Malhotra, S.& Agarwal, AK. (2009). Deafness: Burden, Prevention and Control in India. *National Medical Journal of India*, 2(2),79-81.

Ghoul, El, Oussama,& Jemni, Mohamed. (2009). Multimedia Courses Generator for Deaf Children. *The International Arab Journal of Information Technology.*

Gentry, M.M., Chinn, M.K.& Moulton, D.R.(2005). Effectiveness of Multimedia Reading Materials When Used with Children Who are Deaf. *American Annals of the Deaf*, 149(5).

Ju, Jing-Ming.(2009). The Effects of Multimedia Stories of Deaf or Hard-of-Hearing Celebrities on the Reading Comprehension and English Words Learning of Taiwanese Students with Hearing Impairment. *Asian Journal of Management and Humanity Sciences*, 4(2-3), 91-105.

Joel,O., Edwards,K., Yalo,A., Eric,K., Janet,W.M., Oracha,A.P. & Charles,M.W. (2013).Strategies of Promoting Positive Attitude towards Learners with Hearing Impairment by Regular Primary Schools in Kenya (A Case study for Kakamega County). *Greener Journal of Educational Research,*3 (2). 064-071.

Ke, F. (2008). A Case Study of Computer Gaming for Math: Engaged Learning from Gameplay? Computers & Education. 51(4). 1609-1620.

Kamat, V. & Shinde, J. (2009). "Enrichment of the learning experience of rural children through interactive multimedia," The Pan-Commonwealth Forum on Open Learning.

Mprah,K.W. (2013). Exploring Knowledge and Attitudes Towards HIV/AIDS among Deaf People in Ghana.24(2).

Margie, J.& Liu, M. (1996). Introducing Interactive Multimedia to Young Children: A case

Study of How Two-Years-Olds Interact with the Technology. Educational Resources Information center.

Muller, D., Eklund, J., & Sharma, M.,(2006). The Future of Multimedia Learning: Essential Issues for Research. MUL

Nusir, S., Alsmadi, I., Kabi- Al, M.& Sharadgah, F.(2012). Studying the Impact of Using Multimedia Interactive Programs at Children Ability to Learn Basic Math skills.

Norhayati, A. M., & Siew, P. H. (2004). Malaysian Perspective: Designing Interactive Multimedia Learning Environment for Moral Values Education. Educational Technology & Society, 7 (4), 143-152.

NUEPA (2012). Elementary Education in India: Progress towards UEE (flash statistics). National University of Educational Planning and Administration, New Delhi.

NCERT (2008). Seventh All India School Education Survey (7th AISES), Schools for Physically Challenged Children. New Delhi, NCERT

N.A.D. Deaf Education Retrieved from

file://localhost/D:/reports/NAD%20Deaf%20Education.html

Sharma,P. (2013). Role of Interactive Multimedia for Enhancing Students' Achievement and Retention. *International Women Online Journal of Distance Education,2(3).*

Stith, B. (2004). Use of Animation in Teaching Cell Biology. Cell Biology Education, 3, 181-188.

Singal, Nidhi.(2010). Education of Children with Disabilities in India, Background paper prepared for the Education for All Global Monitoring Report.

The Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act, 1995 Ministry of Law, Justice & Company Affairs (1996): (No. 1 of 1996), New Delhi: The Gazette of India, Page. 24(Available at-http:// socialjustice.nic.in/pwdact1995.php)

Wallander, H. B., Green, S. C., Bavelier, D. (2010). Stretching the Limits of Visual Attention: The Case of Action Video Games. John Wiley & Sons, Ltd.